

Econ 101
Summer 2015
Second Mid-term
Date: June, 15, 2015

Student Name ANNOTATED KEY

Version 1

READ THESE INSTRUCTIONS CAREFULLY.

DO NOT BEGIN WORKING UNTIL THE PROCTOR TELLS YOU TO DO SO

You have 75 minutes to complete this exam including the "bubbling in of your scantron". The exam consists of three parts: Part I is 10 binary response questions worth 2 points each for a total of 20 points; Part II is 20 multiple choice questions worth 3 points each for a total of 60 points; and Part III is two problems worth 10 points each for a total of 20 points. Total number of points on the exam is 100 points. Answer all questions on the scantron sheet with a #2 pencil.

DO NOT PULL THE EXAM APART OR REMOVE THE STAPLE.

WARNING: NO COMMUNICATION OR CALCULATING DEVICES, OR FORMULA SHEETS ARE ALLOWED. NO CONSULTATION AND CONVERSATION WITH OTHERS ARE ALLOWED WHILE YOU ARE TAKING EXAM OR IN THE EXAM ROOM. PLAGIARISM IS A SERIOUS ACADEMIC MISCONDUCT AND PUNISHABLE TO THE FULLEST EXTENT.

PICK ONLY ONE BEST ANSWER FOR EACH BINARY CHOICE OR MULTIPLE CHOICE QUESTION.

How to fill in the scantron sheet and other information:

1. Print your **last name, first name, and middle initial** in the spaces marked "Last Name," "First Name," and "MI." Fill in the corresponding bubbles below.
 2. Print your **student ID number** in the space marked "Identification Number." Fill in the bubbles.
 3. In "Special Code" column A, please enter your exam version number (located at the top of this page) and then bubble in that number in column A.
- If you believe there is an error on the exam or you do not understand something, make a note on your exam booklet and the issue will be addressed AFTER the examination is complete. No questions regarding the exam can be addressed while the exam is being administered.
 - When you are finished, please get up quietly and bring your scantron sheet and this exam booklet to the place indicated by the proctor.

Problem One: (10 points total)

Problem Two: (10 points total)

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DO NOT DETACH THIS SHEET FROM THIS EXAM BOOKLET!

I, _____, agree to neither give nor receive any help on this exam from others. I understand that the use of a calculator or communication device on this exam is academic misconduct. I also understand that providing answers to questions on this exam to other students is academic misconduct, as is taking or receiving answers to questions on this exam from other students. Thus, I will cover my answers and not expose my answers to other students. It is important to me to be a person of integrity and that means ALL ANSWERS on this exam are my answers. Any violation of these guidelines will result in a penalty of at least receiving a zero on this exam.

Signed _____

I. Binary Choice: (10 questions @ 2 points each = 20 points)

1. An example of inelastic demand would be the demand for:

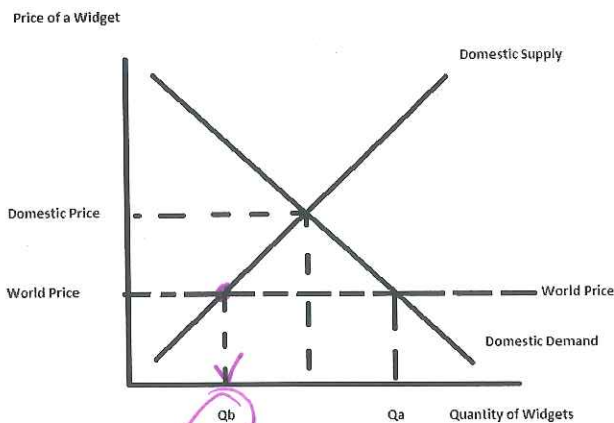
- a) an operation to get your appendix removed if it was about to rupture.
- b) a double chocolate frozen custard in a waffle cone.

Handwritten notes:
 → Inelastic ⇒ not price sensitive ⇒ no close substitutes
 ↳ lots of substitutes ⇒ Elastic
 Elastic: as P ↑, Q ↓

2. Which statement is correct? The more elastic the demand for a good is:

- a) the greater the revenue increase from an increase in the price of that good.
- b) the greater the revenue increase from a reduction in the price of that good.

Use the figure below of the market for widgets in a small, open economy to answer this question.



3. Given the above graph, what quantity is the quantity supplied by domestic producers of widgets?

- a) Q_a
- b) Q_b

Handwritten note:
 Q^S is where P_w intersects Domestic Supply Curve

Definition

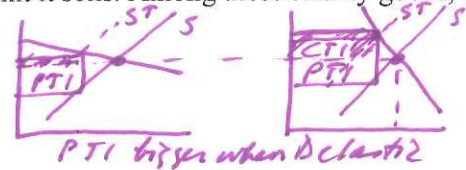
4. Suppose the government imposes an excise tax on bicycles. It requires suppliers of bicycles to pay a \$50 tax on every bicycle they sell. The economic incidence of the tax refers to:

- a) the fact that the seller pays the tax, not the buyer. \Rightarrow Legal Incidence
- b) the degree to which the seller can shift part of the tax to the buyer by charging a higher price. \hookrightarrow who bears economic burden of the tax

More Difficult

5. Suppose the government imposes an excise tax on 20 different goods, and in each case requires the seller to pay a tax to the government equal to \$10 for each unit it sells. Among these twenty goods, the seller will pay more of the tax relative to the buyer:

- a) the more elastic is the demand for the good.
- b) the less elastic is the demand for the good.



DEFN.

6. In comparing college tuition at the University of Wisconsin between 2005 and 2015, which price is a price adjusted for inflation?

- a) The nominal price \hookrightarrow constant dollar price for time series comparisons of dollar-denominated amounts
- b) The real price

EASY

7. George has \$100 in income and the price of Good A is \$10, whereas the price of Good B is \$20. Let Q_A be the quantity of Good A that George consumes and let Q_B be the quantity of Good B George consumes. Given this information, which of the two combinations below is it possible for George to consume?

- a) $Q_A = 6, Q_B = 2$
- b) $Q_A = 2, Q_B = 6$

$P_A = \$10$
 $P_B = \$20$
 Income = \$100

$P_A Q_A + P_B Q_B = I$
 $10(6) + 20(2) = 60 + 40 = 100 \checkmark$
 $10(2) + 20(6) = 140 \neq 100 \times$

DEFN

8. George wants to consume some of Good A and some of Good B. A particular indifference curve for George for Good A and Good B represents:

- a) all the combinations of Good A and Good B at which George would be equally satisfied. \checkmark
- b) all the combinations of Good A and Good B that George can afford to consume given his income and the prices of the two goods. \hookrightarrow this is his budget line \times

READING DEFN

9. Suppose a manufacturer of custom-made canoes has a facility where these canoes are made. The size of the facility is such that six people can work comfortably in the facility and be productive. However, there is room enough in the facility for more than six people to work and adding additional people beyond six does increase production. Therefore, the manufacturer hires more than six people when he needs to produce canoes faster than he can with six people. In fact, hiring a seventh person allows him to increase weekly production of canoes from 100 to 112 per week. In the context of this example, the concept of diminishing marginal returns would predict that hiring an eighth person would:

- a) cause the total output of canoes per week to fall below 112 canoes. \times No, output will \uparrow
- b) allow a further increase in total output of canoes per week, but the increase would be smaller than 12 canoes. \checkmark

DEFN.

10. In perfect competition each producer can sell the good only:

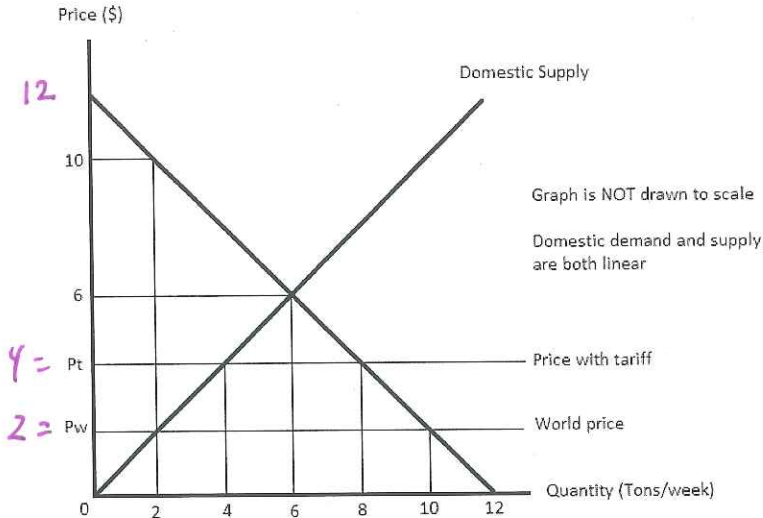
- a) at the market price, which means the producer is a "price taker". \checkmark
- b) by being so competitive that the producer's price is below the market price. \times

\hookrightarrow producer has no need to drop their price below mkt price

II. Multiple Choice: (20 Questions @ 3 points each = 60 points)

Use the figure below to answer the next **THREE (3)** questions.

This figure depicts the market for a small economy for good X. In this figure the domestic demand and domestic supply curves are linear.



11. If the market represented in the above graph is closed to trade, then the value of consumer surplus is _____, the value of producer surplus is _____, and the value of total surplus is _____.

- a) \$36; \$18; \$54
- b) \$36; \$36; \$72
- c) \$24; \$24; \$48
- d) \$18; \$18; \$36

CS = 1/2 (12-6)(6) = 1/2 (6)(6) = \$18 ⇒ can stop here
Since only one answer has CS = \$18
... But, to continue:
PS = 1/2 (6-0)(6) = \$18
TS = CS + PS = \$36

12. Suppose this market opens to trade. If this market is open and there is no tariff, then the value of consumer surplus is _____, the value of producer surplus is _____, and the value of total surplus is _____.

- a) \$34; \$2; \$36
- b) \$50; \$4; \$54
- c) \$50; \$2; \$52
- d) \$18; \$4; \$22

Pw = 2 ⇒ D is P = 12 - Q so if Q^D = 10 ⇒ Pw = 2!
CS_{trade} = 1/2 (12-2)(10) = 1/2 (10)(10) = \$50
PS_{trade} = 1/2 (2-0)(2) = 1/2 (2)(2) = \$2 ⇒ can stop here!
TS_{trade} = CS_{trade} + PS_{trade} = \$52

13. Suppose this market opens to trade but at the same time the government imposes a tariff as marked in the graph on this good. Then, the value of consumer surplus is _____, the value of producer surplus is _____, and the value of total surplus is _____.

- a) \$32; \$16; \$48
- b) \$32; \$8; \$40
- c) \$64; \$8; \$72
- d) \$64; \$4; \$68

Pt = 4 ⇒ D is P = 12 - Q so if Q^D = 8 ⇒ Pt = 4!
CS_{tariff} = 1/2 (12-4)(8) = 1/2 (8)(8) = \$32
PS_{tariff} = 1/2 (4-0)(4) = 1/2 (4)(4) = \$8 ⇒ can stop here!
TS_{tariff} = CS_{tariff} + PS_{tariff} = \$40

Use the following information to answer the next **THREE (3)** questions.

Donald Zurcher is operating a bus company that is a monopoly in Econtown. Demand for bus trips is given by $P = 4 - (1/2000)Q$, where the price is in dollars and Q is the quantity of bus trips per day.

SOME
WORK-
BUT NOT
HARD

14. What is the point elasticity of demand for bus trips when $P = \$1$?

- a) 1/3
- b) -1/2000
- c) 2/3
- d) 1

$$E_D = \left[\frac{1}{-\text{slope}} \right] \left[\frac{P}{Q} \right]$$

$$E_D = \left[\frac{-1}{2000} \right] \left[\frac{1}{6000} \right]$$

$$E_D = [2000] \left[\frac{1}{6000} \right] = \frac{1}{3}$$

When $P = 1 \Rightarrow$
 $1 = 4 - (1/2000)Q$
 $(1/2000)Q = 3$
 $Q = 6000$

EASY

15. What is the equation for the marginal revenue curve for Donald Zurcher's bus company?

- a) $MR = 4 - (1/1000)Q$ ✓
- b) $MR = 4 - (1/2000)Q$ ✗
- c) $MR = 8 - (1/1000)Q$
- d) $MR = 8 - (1/2000)Q$

MR has same y-intercept as D curve for monopoly & double the slope:

$$MR = 4 - 2 \left(\frac{1}{2000} \right) Q$$

$$MR = 4 - \left(\frac{1}{1000} \right) Q$$

DEFN.

16. Now suppose that Super, a taxi company, increases their prices. Which of the following could Donald Zurcher use to predict the effect of this price increase on the quantity demanded for his company's bus trips?

- a) The elasticity of demand for bus trips with respect to the price of bus trips. ✗
- b) The cross-price elasticity of demand for bus trips and taxi rides. ✓ *← Since the price of a related good is changing*
- c) The income elasticity of demand for bus trips. ✗
- d) The elasticity of supply of bus trips with respect to the price of bus trips. ✗

Use the information below to answer the next **THREE (3)** questions.

Consider the market for picture frames that can be described by the following equations where Q is the quantity of picture frames and P is the price per picture frame:

Demand for Picture Frames: $Q = 10 - (1/4)P$

Supply of Picture Frames: $Q = P$

Suppose that in this market for picture frames an excise tax of \$5 per picture frame is imposed on producers of these frames.

17. Prior to the imposition of the tax, the total surplus in this market is equal to \$160; after the imposition of this tax, the total surplus in this market (include the government's share of the surplus as part of the total surplus) is equal to \$157.50, and the deadweight loss due to this tax is equal to \$2.50.

- a) \$40.00; \$16; \$2.50
- b) \$160.00; \$108.00; \$5
- c) \$320.00; \$157.20; \$5
- d) \$160.00; \$157.50; \$2.50

JUST MATH - PREDICTABLE

18. Given the imposition of this excise tax on picture frames, relative to the initial pre-tax equilibrium price, the price per unit paid by consumers ↑ while the net price received by producers ↓.

- a) increases by \$5; decreases by \$0
- b) increases by \$1; decreases by \$4
- c) increases by \$4; decreases by \$4
- d) increases by \$4; decreases by \$1

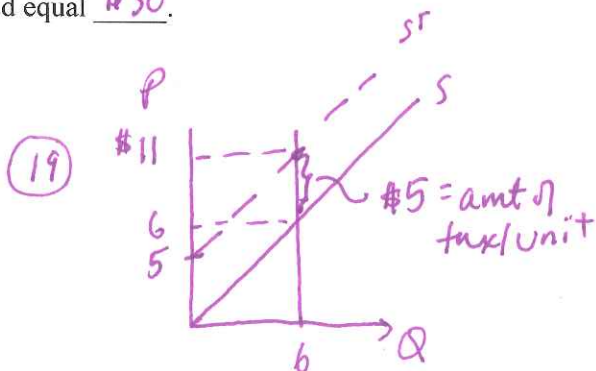
↳ ↑ to \$12 ⇒ an ↑ of \$4
 ↓ to \$7 ⇒ a ↓ of \$1

19. Suppose that the demand curve is not the one you were provided but is instead a perfectly inelastic demand curve that can be written as:

Demand for picture frames: $Q = 6$

If the government imposes an excise tax of \$5 per picture frame given this demand curve, then the price to consumers once the excise tax is imposed would be \$11, the quantity of picture frames sold would be 6, and the total tax collected by the government would equal \$30.

- a) \$11.00; 2; \$8.00
- b) \$10.00; 6; \$30.00
- c) \$11.00; 6; \$30.00
- d) \$16.00; 6; and \$30.00

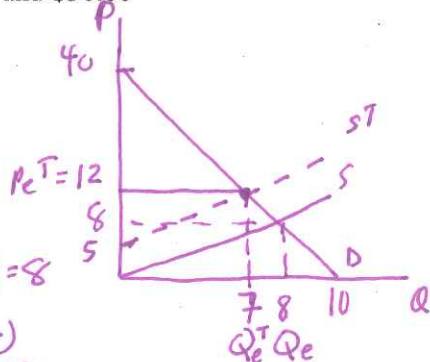


Tax Rev = (tax/unit) (# of units)
 = (\$5/unit) (6 units)
 = \$30

(17) & (18)

Before tax:

$10 - \frac{1}{4}P = P$
 $10 = \frac{5}{4}P$
 $40 = 5P$
 $P_e = 8$
 $Q_e = 10 - \frac{1}{4}(8) = 8$



$TS = \frac{1}{2}(40-0)(8)$
 $TS = (40)(8) = \$160$

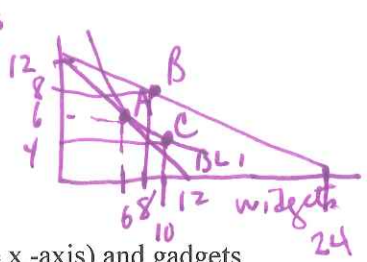
After tax:

$ST: P = 5 + Q$
 $Q = P - 5$
 $10 - \frac{1}{4}P = P - 5$
 $15 = \frac{5}{4}P$
 $P_e = 12$

$Q_e^T = 10 - \frac{1}{4}(P_e^T)$
 $Q_e^T = 10 - \frac{1}{4}(12)$
 $Q_e^T = 7$
 $DWL = \frac{1}{2}(12-7)(8-7) = \2.50
 $TSw/tax = 160 - 2.50 = \$157.50$

$$\left. \begin{array}{l} I = 120 \\ P_G = 10 \\ P_W = 5 \end{array} \right\} BL_2 \rightarrow (8, 8)$$

$$\left. \begin{array}{l} I = 120 \\ P_G = 10 \\ P_W = 10 \end{array} \right\} BL_1 \rightarrow A(6, 6)$$



THE GRAPH IS CHALLENGING

Use the information provided below to answer the next **THREE (3)** questions.

Suppose an individual has \$120 available to spend on widgets (measured on the x-axis) and gadgets (measured on the y-axis). This individual knows that the price of widgets is \$10 per unit and the price of gadgets is also \$10 per unit. When this individual maximizes their utility given their income and the prices of the two goods she consumes a bundle of widgets and gadgets that consists of 6 widgets and six gadgets. \Rightarrow point A on BL_1

When the price of widgets falls to \$5 per unit and everything else is held constant, this individual consumes a bundle of widgets and gadgets that consists of 8 widgets and 8 gadgets. \Rightarrow point B on BL_2

If this consumer were constrained to face the new prices (price of a widget is \$5 per unit and the price of a gadget is \$10 per unit) while having the same level of utility as she had initially, the consumer would consume 10 widgets and 4 gadgets. \Rightarrow point C on BL_3

ON THE HARD SIDE

20. Given this information, the income effect of the fall in the price of widgets from \$10 per unit to \$5 per unit is equal to:
- an increase of 2 widgets.
 - an increase of 4 widgets.
 - a decrease of 4 widgets.
 - a decrease of 2 widgets.**

ON THE HARD SIDE

21. Given this information, the substitution effect of the fall in the price of widgets from \$10 per unit to \$5 per unit is equal to:
- an increase of 2 widgets.
 - an increase of 4 widgets.**
 - a decrease of 4 widgets.
 - a decrease of 2 widgets.

Consumption of X at B is 10
 " " " " B is 8
 C to B: Income Effect \Rightarrow \downarrow in widget consumption of 2 units
 A to C: Sub effect = \uparrow of 4 widgets

ON THE HARD SIDE

22. Given this information, the income compensated budget line (what we called budget line 3 in class) is one based upon the new prices (price of widgets is \$5 per unit and price of gadgets is \$10 per unit) and just tangent to the initial indifference curve. In this example, this budget line is drawn with an income level that is equal to:
- \$210, since the change in the price of widgets resulted in this consumer having greater purchasing power.
 - \$120, since in these problems income is held constant no matter if a price change alters the consumer's real purchasing power.
 - \$90, since the change in the price of widgets resulted in this consumer having greater purchasing power.**
 - \$150, since the change in the price of widgets resulted in this consumer having greater purchasing power so to find the new budget line 3 the consumer's income must be increased due to this increase in purchasing power.

BL_3 Contains 10 widgets at a price of \$5/widget \Rightarrow \$50
 4 gadgets at a price of \$10/gadget \Rightarrow 40
 \$90 is cost of this combination 8

HARD

23. When Juanita finished college she took a job in August of 2014 for \$40,000. Her mother told Juanita that she (the mother) took a job when she finished college in 1994, and it paid only \$33,000. She said Juanita was much better off than she (the mother) had been in her first job after college. Juanita had taken economics while she was in college. She told her mother that it wasn't clear who earned more, in real terms, adjusted for inflation. Juanita looked up the CPI for 1994 and 2014, and found it was 180 and 240, respectively. Based on this information which one of the following statements is correct?

- a) We do not have enough information to convert the mother's salary to its equivalent measured in 2014 dollars. X
- b) Juanita's mother earned \$44,000 expressed in 2014 dollars. ✓
- c) Juanita's mother earned $(\$33,000) * (180/240) * 100\%$, expressed in 2014 dollars.
- d) Juanita earned $\$33,000 * (180/240) * 100\%$, expressed in 2014 dollars. X

24. In January of 1995 the CPI was 150 and by April 2011 it was 225. By what percentage did prices rise as measured by the CPI between January 1995 and April 2011?

- a) 1.50%
- b) 75%
- c) 33%
- d) 50%

$$\% \Delta \text{ in Prices} = \left[\frac{225 - 150}{150} \right] (100\%)$$

$$= \left[\frac{75}{150} \right] (100\%) = 50\%$$

25. Suppose that Joey's demand for ice cream cones is given by the following equation where P is the price per ice cream cone and Q is the number of ice cream cones:

$$Q = 100 - 10P$$

Currently the price of an ice cream cone is \$2. Using the arc elasticity formula calculate the price elasticity of demand if the price of an ice cream cone increases by \$1. The price elasticity of demand equals:

- a) 4.
- b) 1/4.
- c) 3.
- d) 1/3.

25 if $P_1 = \$2 \Rightarrow Q_1 = 80$
if $P_2 = \$3 \Rightarrow Q_2 = 70$

$$E_D = \left| \frac{\frac{Q_2 - Q_1}{Q_2 + Q_1}}{\frac{P_2 - P_1}{P_2 + P_1}} \right| = \left| \frac{\frac{70 - 80}{150}}{\frac{3 - 2}{5}} \right| = \frac{1}{15} \div \frac{1}{5} = \frac{1}{15} \times \frac{5}{1} = \frac{1}{3}$$

23.

Year	Nom Salary	CPI	Real Salary
1994	\$33,000	180	$\frac{33,000}{180} \cdot 100 = \frac{11,000}{6} (100) = A$
2014	40,000	240	$\frac{40,000}{240} \cdot 100 = \frac{10,000}{6} (100) = B$

A > B!

CPI by 2014
1994 $\frac{180}{240} (100) = 75$
2014 100

$$\Rightarrow \text{Real} = \frac{\text{Nom}}{\text{CPI}} (\text{scale})$$

$$\text{Real in 2014} = \frac{33,000}{75} (100)$$

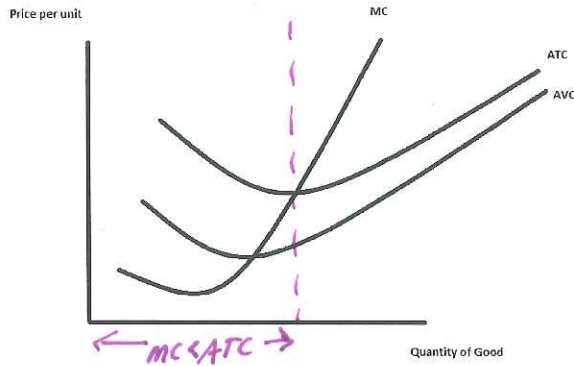
$$= \frac{11,000}{3} (100) = 44,000$$

$$\text{Real} = \frac{\text{Nom}}{\left(\frac{180}{240}\right)(100)} [100]$$

$$\text{Real} = \text{Nom} \left(\frac{240}{180} \right)$$

Use the figure below of a firm's cost curves to answer the next **TWO (2)** questions.

In this figure, MC is the marginal cost curve, ATC is the average total cost curve, and AVC is the average variable cost curve.



MEDIUM

26. In the above figure, at quantities of output where points on the marginal cost curve lie below points on the average total cost curve, the production of an additional unit of the good:

- a) increases total cost by less than the average cost per unit.
- b) increases total cost by more than the average cost per unit. X
- c) reduces total cost. X $At Q \uparrow \Rightarrow TC \uparrow$
- d) reduces fixed cost. X $FC \text{ is fixed} \Rightarrow \text{Does not } \Delta$

ATC is falling as $Q \uparrow$ in this range

MEDIUM

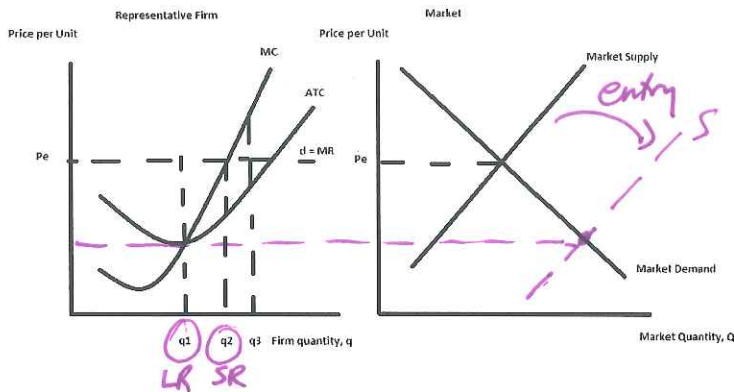
27. Based on the above figure:

- a) the firm must always operate at the quantity of output at which MC and ATC intersect. X *Only in LR*
- b) the firm must always operate at the quantity of output at which MC and AVC intersect. X *Must be here or $MC > AVC$ in SR*
- c) the firm's average fixed cost must be declining as the quantity of output increases. ✓
- d) the firm's total fixed cost increases as the quantity of output increases.

does not Δ as quantity \uparrow output increases

*Since FC is constant, as $Q \uparrow$, AFC \downarrow
 Since $AFC = \frac{FC}{Q}$
 and if FC is constant & Q gets larger, then FC/Q gets smaller.*

Use the figure below of a perfectly competitive market and a representative firm in this market to answer the next **THREE (3)** questions.



28. The firm views its demand curve, d , as horizontal at the market price, because:

- EASY**
- a) the market demand for this product is perfectly elastic. *X Market demand is not perfectly elastic*
 - b) the firm believes the demand for this good is perfectly inelastic. *X Firm sees demand as perfectly elastic*
 - c) the firm is a price-taker, and it behaves as if it can sell as much of the good as it wants without affecting the market price of the good. *✓*
 - d) the firm is a price-taker, but the firm believes it will still affect the price of the good if it sells too much of the good. *X No, firm does not affect price*

29. We know that a perfectly competitive firm can vary the amount of output it produces and sells in the market. Given the above graphs, this firm will maximize its profits at: *q2 when MR = MC*

- MEDIUM**
- a) q_1 because total revenue will increase more than total cost if the firm increases output by one unit. *X*
 - b) q_2 because at q less than q_2 , the firm when it increases output by one unit will raise revenue more than it increases cost, and at q more than q_2 , the firm when it increases output by one unit will raise cost more than it increases revenue. *✓*
 - c) q_3 because at q less than q_3 , the firm when it increases output by one unit will raise revenue more than it increases cost. *X*
 - d) q_3 because the higher the output, the more of the good the firm can sell without lowering the price of the good. *X*

30. A firm maximizing profits in this market will have $(+)$ economic profits in the short run and in the long run *entry* of firms will cause the supply curve to shift to the *right*, which will cause economic profits for the firms in the market to go to zero.

- MEDIUM**
- a) negative; exit; left *X*
 - b) positive; exit; left *X*
 - c) positive; entry; left *X*
 - d) positive; entry; right *✓*

III. PROBLEMS (2 problems @ 10 points = 20 points)

1. The market for bananas in a small, closed economy can be described by the following domestic demand and domestic supply curves where P is the price per unit of bananas in dollars and Q is the quantity of bananas in thousands:

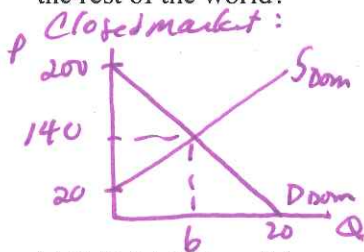
Domestic Demand: $P = 200 - 10Q$

Domestic Supply: $P = 20 + 20Q$

In the world market for bananas the price is \$40 per unit of bananas.

$P_w = \$40$

a) (1 Point) Below what price will this country import bananas if it opens its banana market to trade with the rest of the world?



$$200 - 10Q = 20 + 20Q$$

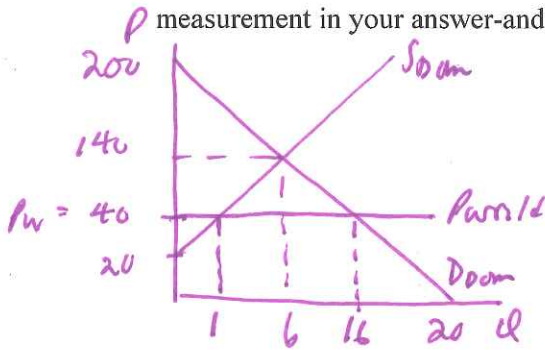
$$180 = 30Q$$

$$Q = 6$$

$$P = 200 - 10(6) = 140$$

This country will import bananas if it opens its mkt to trade & the world price is less than \$140 (unit) bananas

b) (2 Points) Once this economy opens the banana market to trade how many units will be imported or exported? Give a number and indicate if the economy is importing or exporting. Hint: Provide units of measurement in your answer-and be thoughtful here!



D: If $P_w = 40 \Rightarrow 40 = 200 - 10Q$
 $10Q = 160$
 $Q_{Dom}^D = 16$ thousand of bananas demanded domestically

S: If $P_w = 40 \Rightarrow 40 = 20 + 20Q$
 $20 = 20Q$
 $Q_{Dom}^S = 1$ thousand bananas supplied domestically
 Imports = 15,000 bananas

c) (3 Points) Suppose the government of this small economy opens the market for bananas to trade but imposes an import quota of 9,000 bananas. What price will bananas sell for in this small economy after the quota has been imposed?

Method 2:

With Import Quota:

$$Q_{Dom}^S + \text{Import Quota} = Q_{Dom}^D \text{ with quota}$$

$$\frac{1}{20}P - 1 + 9 = 20 - \frac{1}{10}P$$

$$\frac{3}{20}P = 12$$

$$P = 80$$

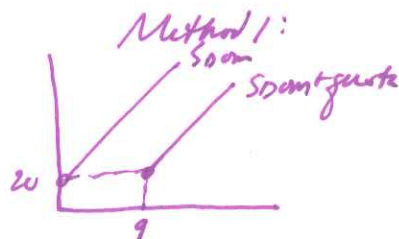
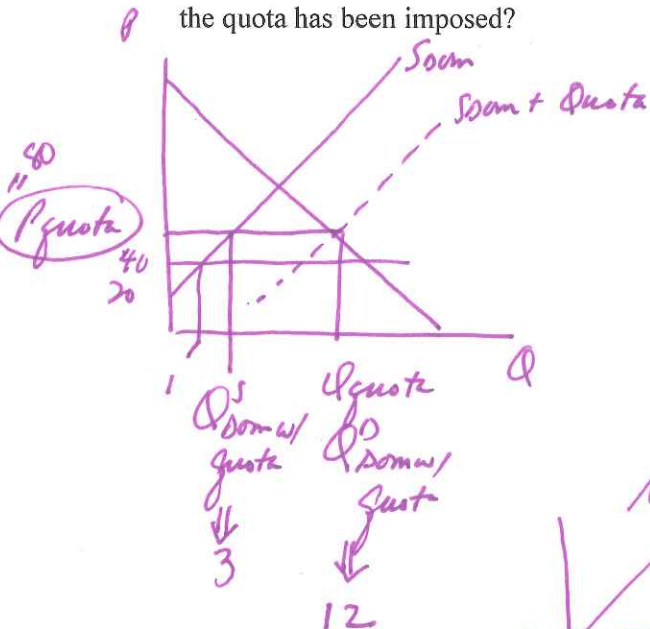
$S_{quota}: P = 6 + 20Q$
 $(Q, P) = (9, 20)$
 $20 = 6 + 20(9)$
 $-160 = 6$
 $P = 20Q - 160$

$$20Q - 160 = 200 - 10Q$$

$$30Q = 360$$

$$Q = 12 \text{ quota}$$

$$P = 200 - 10(12) = 80 \text{ quota}$$



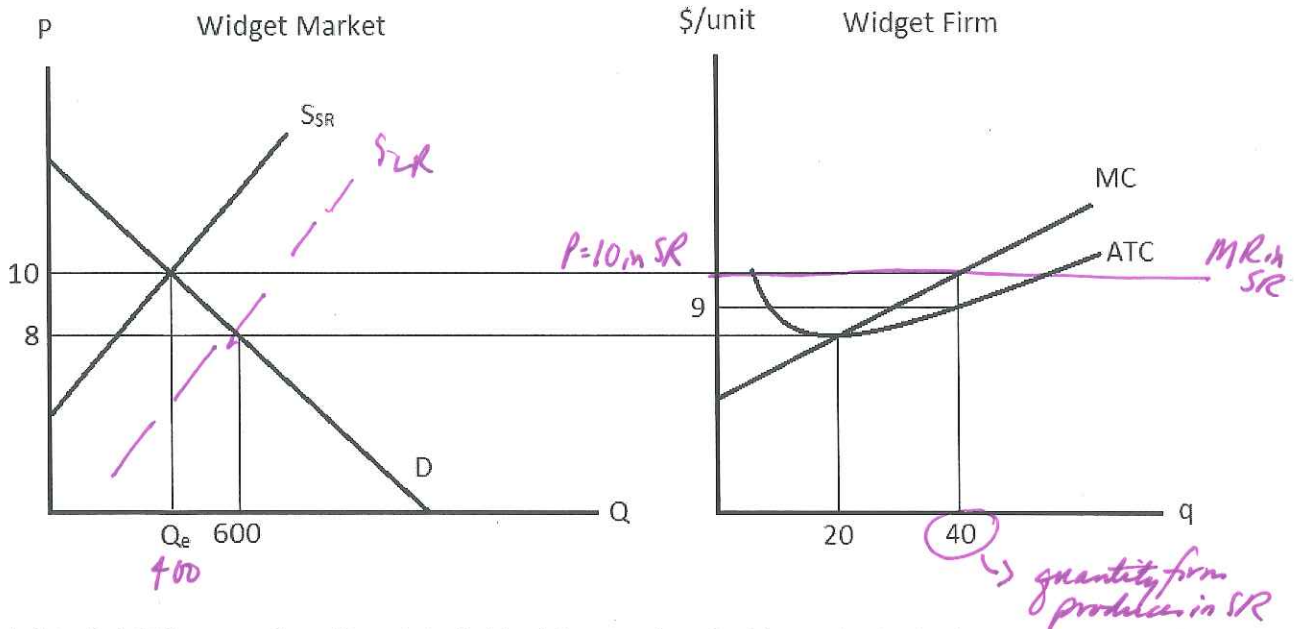
d) (2 points) From class discussion we know that imposition of an import quota in an open market results in deadweight loss. Calculate the value of deadweight loss due to having less efficient domestic producers produce more bananas once this import quota is imposed. Hint: Show your work-be careful to get the right "scale" of units in your final answer.

$$\begin{aligned}
 \text{DWL due to using less} &= \frac{1}{2} (P_{\text{quota}} - P_{\text{world}}) (Q_{\text{dom}}^{\text{w/ quota}} - Q_{\text{dom}}^{\text{open}}) \\
 \text{efficient domestic} & \\
 \text{producers} & \\
 &= \frac{1}{2} (\$50/\text{banana} - \$40/\text{banana}) (3000 \text{ bananas} - 1000 \text{ bananas}) \\
 &= \frac{1}{2} (\$40/\text{banana}) (2000 \text{ bananas}) \\
 &= \$40,000
 \end{aligned}$$

e) (2 points) Instead of using a quota the government could have imposed a tariff. Assuming the government did not impose a quota, fill in the table below.

Tariff	Imports
\$0/unit of bananas	15,000 bananas
\$40/unit of bananas	9,000 bananas

2. The figure below illustrates the market for widgets, which is initially in an equilibrium with supply given by S_{SR} and demand D . The market for widgets is perfectly competitive and all firms are identical with marginal cost and average total cost as shown in the figure below. Price is in dollars and all quantities are in units of widgets.



a) (1 Point) What quantity will each individual firm produce in this market in the initial short-run equilibrium? State which two things the firm is setting equal to each other to maximize profits.

To profit max., the firm produces that q where $MR = MC$
 Since $P = MR = \$10$ in SR \Rightarrow we are looking for where $\$10 = MC \Rightarrow$
 this occurs at a quantity of 40 widgets

b) (1 Point) Suppose in the initial short-run equilibrium there are 10 firms in this market. What is the market quantity (Q_e) in this equilibrium?

If each firm produces 40 widgets and there are 10 firms, then $Q_e =$
 $(40 \text{ widget/firm}) (10 \text{ firms}) = 400 \text{ widgets}$

c) (2 Points) In the initial short-run equilibrium each firm has total revenue of \$400 and has total costs of _____. Show how you found your answers for full credit!

$$TR = P \cdot q = (\$10/\text{widget}) (40 \text{ widgets}) = \$400$$

$$TC = ATC \cdot q = (\$9/\text{widget}) (40 \text{ widgets}) = \$360$$

d) (1 Point) Will firms enter or exit this industry in the long run? Briefly explain how you determined whether there would be long run entry or exit and what will happen to the supply curve in this market in the long run.

Since $\pi_{SR} > 0$ ($\pi = TR - TC$ or $\pi = \$40$) there will be entry of firms into this market.
The market supply curve will shift to the right so that $P_e = 8$ and $Q_e = 600$ in the LR.

e) (1 Point) At the breakeven point for all firms in this market the price is $\$8/\text{widget}$ and firms produce a quantity of 20 widgets . Briefly justify your answer.

When $P = \$8/\text{widget} \Rightarrow MR = MC$ occurs for each firm at a quantity of 20 units.

$$\begin{aligned} \text{When } q = 20, P_e = \$8 &\Rightarrow TR = \$160 \\ TC = ATC \cdot q &= (\$8/\text{widget})(20\text{ widgets}) \\ TC &= \$160 \\ \pi_{\text{firm}} &= 0 \Rightarrow \text{Firms break even} \end{aligned}$$

f) (2 Points) Determine the values of each of the following when this market operates in the long run.

The market price = $\$8/\text{widget}$

The market quantity = 600 widgets

The number of firms in the market = 30 firms

$$\frac{Q_e}{q_e} = \frac{600}{20} = \# \text{ of firms in the market} = 30 \text{ firms}$$

g) (2 points) Suppose each firm has an average variable cost equation given by $AVC = (1/10)q + 4$. Calculate the fixed costs of each firm.

From (e) $TC = 160$

$$\begin{aligned} q = 20 \text{ widgets} &\Rightarrow AVC = \frac{1}{10}(q) + 4 \\ &= \frac{1}{10}(20) + 4 \end{aligned}$$

$$AVC = 6$$

$$VC = AVC \cdot q$$

$$= (\$6/\text{unit})(20\text{ units}) = \$120$$

$$TC = FC + VC = FC + 120 = 160$$

$$FC = \$40$$